REMARKS

Presently, claims 1, 3-5, 7-13 and 21-22 are pending in the application. Claims 2, 6 and 14-20 have been canceled. Claims 1, 3-5 and 7-13 have been amended to more particularly point out and distinctly claim the present invention. Support for the amendments to claims 1 and 13 may be found, for example, in the paragraph bridging pages 3 and 4 of the specification and Fig. 1. New claims 21 and 22 have been added to alternatively recite the present invention. Support for the features recited in claims 21 and 22 may be found, for example, in the first full paragraph on page 4 of the specification and in Fig. 2. Accordingly, no new matter has been added to the application by the foregoing amendments.

Information Disclosure Statement

Applicant notes that the Examiner has not acknowledged the Information Disclosure Statements filed in the present application on March 19, 2001; August 6, 2002; December 30, 2002; and May 7, 2003.

Applicant respectfully requests that the Examiner forward an initialed copy of the above-identified Information Disclosure Statements, showing consideration of all the references identified therein, with the next Office Action.

Claim Rejections – § 102(b)

The Examiner has rejected claims 1-6, 11 and 13-20 under 35 U.S.C. § 102(b) as being anticipated by International Published Patent Application No. WO 96/22562 to Manning ("Manning"). The Examiner contends that Manning teaches each and every element of the present invention. Applicant respectfully traverses this rejection.

Manning discloses an all-optical switch having a fixed (not variable) planar optical delay line used to split a control signal to provide two control streams with a predetermined delay between them (see pg. 7, lines 15-18). Manning's switch includes a pair of arms arranged in a Mach-Zehnder configuration, and applies external control pulses having a selectable period and relative delay to a pair of gain elements in a Mach-Zehnder interferometer. Although Manning discloses advancing the timing of control pulses appropriately with respect to data pulses,

Manning does not refer to any specific type of adjustable component that is mounted in a semiconductor device (see pg. 9, lines 9-12).

The present invention provides a semiconductor device which selectively routes individual data bits or groups of data bits in a data stream without having to make external adjustments at the source of the data stream and/or clocking signal to change the characteristics of signals used by the switch. Data is routed through an optical device having plural outputs. The output through which the data is outputted is dependent upon the time delay value of a time delay element mounted in a semiconductor device. The primary function of the present invention is to route (switch) digital data bits (packets) in an all-optical format for transmission, or further signal processing, in an all-optical communication network. The present invention utilizes destructive and constructive wave interference, created by the nonlinear effects of two semiconductor optical amplifiers, located in the parallel arms of a Mach-Zehnder interferometer, a four port quadrature optical coupler placed at the output, in conjunction with one or more variable time delays to create an extremely fast all-optical routing device that can be used to randomly select individual bits or groups of bits and route (switch) them onto one of two possible output paths.

Claim 1 recites:

> An all-optical switch mounted in a semiconductor device, the switch comprising:
>
> (a) a first input for receiving a data stream;
>
> (b) a second input for receiving a clocking signal;
>
> (c) first and second nonlinear optical elements mounted in the semiconductor device and being in communication with the first input, the nonlinear optical elements for processing the data stream in response to the clocking signal;
>
> (d) a first variable time delay element mounted in the semiconductor device for receiving the clocking signal, the first time delay element having a first adjustable time delay value and being in communication with the second input and the second nonlinear optical element; and
>
> (e) an optical coupler having plural outputs, the optical coupler being in communication with the first and second nonlinear elements, wherein the first adjustable time delay value of

> the first adjustable time delay element determines the output of the optical coupler that individual data bits or groups of data bits in the data stream are desired to be routed to.

For a rejection under § 102(b) to be proper, a reference must disclose, either explicitly or inherently, each and every element of the claimed invention. Applicant respectfully submits that Manning does not teach each and every element recited in independent claim 1.

Manning fails to disclose a variable time delay element mounted in a semiconductor device that delays a clocking signal for a selected period of time, or an adjustable time delay value, before reaching a nonlinear optical element, and thus does not disclose the invention of independent claim 1. The all-optical switch of independent claim 1 includes a first variable time delay element mounted in the semiconductor device. In contrast, the time delay element used in Manning's switch has a fixed, predetermined value. Additionally, the switch of claim 1 receives a clocking signal (i.e., a single clocking signal, not two separate control pulses from separate inputs) from a second input. Such a configuration allows the first variable time delay element to be adjusted during assembly and/or operation of the switch such that "the first adjustable time delay value of the first adjustable time delay element determines the output of the optical coupler that individual data bits or groups of data bits in the data stream are desired to be routed to." Accordingly, independent claim 1 is believed to be allowable over Manning.

Dependent claims 3-5, 7-12 and 21-22 are allowable at least by their dependency on independent claim 1.

Independent claim 13 recites a method of routing data through an all-optical switch. For the same reasons as discussed above with respect to independent claim 1, Manning does not disclose the use of a variable time delay element. Thus, Manning's optical switch does not control "the states of the first and second nonlinear optical elements with the clocking signal," nor adjust "the time delay value of the variable time delay element depending upon which output of the optical coupler that individual data bits or groups of data bits in the data stream are desired to be routed to." Accordingly, independent claim 13 is believed to be allowable over Manning.

Claims 2, 6 and 14-20 have been canceled. Reconsideration and withdrawal of the Examiner's § 102(b) rejection of claims 1-6, 11 and 13-20 are respectfully requested.

Claim Rejections – § 103(a)

The Examiner has rejected claims 7-10 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Manning. The Examiner contends that it would have been obvious to combine time delay elements not taught by Manning, but which are generally known in the art, with the other teaching of Manning to result in Applicant's claimed invention. Applicant respectfully traverses this rejection.

For the same reasons as discussed above with respect to the Examiner's § 102(b) rejection, Manning does not teach or suggest each and every element of independent claim 1. The fact that certain types of time delay elements may be well known in the art as the Examiner contends, does not teach or suggest the other elements discussed above which are missing from Manning. Accordingly, claim 1 is believed to be patentable over Manning.

Dependant claims 7-10 and 12 are allowable at least by their dependency on independent claim 1. Reconsideration and withdrawal of the Examiner's § 103(a) rejection are respectfully requested.

Double Patenting

The Examiner has provisionally rejected claims 1-20 under the judicially created doctrine of double patenting as being unpatentable over claims 1-21 of U.S. Patent Application No. 09/811,720, now U.S. Patent No. 6,650,800 B2 ("the '800 patent"). The Examiner issued a provisional double patenting rejection, since the claims '800 patent had not issued at the time of the present Office Action. The Examiner contends that, although not identical, the conflicting claims are not patentably distinct from each other, and that the '800 patent therefore teaches the subject matter of claims 1-20.

Although disagreeing with the Examiner's double patenting rejection, to further prosecution of the present application, Applicant has submitted a Terminal Disclaimer under 37 C.F.R. 1.321(b) herewith, stating that the '800 patent and the present application are commonly owned and disclaiming the terminal part of the statutory term of any patent granted on the present application which would extend beyond the full statutory term of the '800 patent. Reconsideration and withdrawal of the Examiner's non-statutory, obviousness-type double patenting rejection are respectfully requested.

Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully submits that the Examiner's rejections have been overcome, and that the application, including claims 1, 3-5, 7-13 and 21-22, is in condition for allowance. Reconsideration and withdrawal of the Examiner's rejections and an early Notice of Allowance are respectfully requested.

Respectfully submitted,

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